

# Final Report Hot Absorbers and the X-Ray Spectra of BL Lac Objects for NASA Grant: NAG5-1671

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Period Covered: October 1991 - February 1994

## 1 Summary

This is the final report to the National Aeronautics and Space Administration (NASA) concerning NASA grant NAG5-1671. This grant was awarded to Dr. C. Megan Urry of the Space Telescope Science Institute in response to a proposal, entitled "Hot Absorbers and the X-Ray Spectra of BL Lac Objects." The grant was originally awarded in October 1991 and expired in February 1994.

The purpose of this project was to detect spectral features in high signal-to-noise Rosat PSPC spectra of X-ray-bright BL Lac objects. We were granted observations of three targets: PKS2155-304, Mrk421, and Mrk501. All three were bright and yielded 5,000-30,000 photons in the good PSPC data.

We spent considerable time and effort trying to analyze these spectra. We did detect spectral features but were for a long time unable to determine whether they were due to instrumental effects. The appropriate analysis tools (gain-variable PSPC response matrices) have not yet been developed by the Rosat support scientists, which means we can not appropriately analyze our data. We did make some tests, artificially shifting the spectra by several channels, which suggest that the absorption features we see are most likely instrumental.

This means our results are somewhat disappointing. Preliminary results were presented at the Rosat Symposium in November 1993 (Gilmore et al. 1993) and we have drafted a more detailed report describing the results of our investigation. Whether this should become a published paper or not is unclear; probably we will publish a much shorter version. This will be done as soon as possible, time permitting.

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In this same time period, we have done some related work on Rosat data, which is relevant to the topic of this grant; specifically, investigations of the soft-X-ray (PSPC) spectra of Seyfert 2 galaxies (Turner et al. 1994) and of the superluminal quasar 3C345 (Unwin et al. 1994).

## 2 Bibliography

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